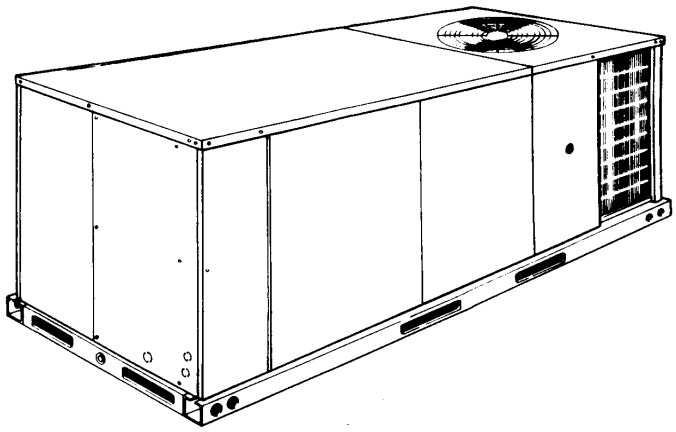
SUNLINE 2000™
SINGLE PACKAGE HEAT PUMPS

INSTALLATION INSTRUCTION | Supersedes: 511.06-N5Y (1298) | 511.06-N5Y (500)

035-16197

MODELS B*CH 036 AND 048 (STYLE B) AND MODELS B*CH 060A (STYLE A) (10 SEER - w/Belt-Drive Option)

(* = 3 or 5)



GENERAL

YORK Model BCH units are single package heat pumps designed for outdoor installation on a rooftop or a slab. Supplemental electric heaters are available as field-installed accessories.

The units are completely assembled on rigid, permanently attached base rails. All piping, refrigerant charge, and electrical wiring is factory-installed and tested. The units require only electric power and duct connections at the point of installation.

The supplemental electric heaters have nickel-chrome elements and utilize single point power connection.

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing. Refer to Form 50.15-NM for additional information.

REFERENCE

Additional information on the design, installation, operation and service of this equipment is available in the following reference forms:

- 55.70-N1 -General Installation
- 55.70-N2 -Pre-start & Post-start Check List
- 530.18-N1.2V -Economizer Accessory
- 530.18-N1.13V -Man. Outdoor Air Damper Accy 0-35%
- 530.18-N1.14V -Man. Outdoor Air Damper Accy 0-100%
- 530.18-N1.12V -Motorized Outdoor Air Damper Accy.
- 530.18-N7.1V -Electric Heater Accessory
- 530.18-N7.2V -Fuse Block Accessory

Replacement Parts:

- Refer to Parts Manual for complete listing of replacement parts on this equipment.

All forms referenced in this instruction may be ordered from:

Standard Register
Norman, OK 73069
Toll Free: Tel. 877-318-9675/Fax. 877-379-7920

APPROVALS

Design certified by U.L. and C.G.A. as follows:

1. For use as a heat pump only unit or a heat pump unit with supplemental electric heat.
2. For outdoor installation only.
3. For installation on combustible material.

LIMITATIONS

CAUTION
THIS PRODUCT MUST BE INSTALLED IN STRICT COMPLIANCE WITH THE ENCLOSED INSTALLATION INSTRUCTIONS AND ANY APPLICABLE LOCAL, STATE, AND NATIONAL CODES INCLUDING, BUT NOT LIMITED TO, BUILDING, ELECTRICAL, AND MECHANICAL CODES.

WARNING
INCORRECT INSTALLATION MAY CREATE A CONDITION WHERE THE OPERATION OF THE PRODUCT COULD CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

Installer should pay particular attention to the words: *NOTE, CAUTION* and *WARNING*. Notes are intended to clarify or make the installation easier. Cautions are given to prevent equipment damage. Warnings are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

TABLE OF CONTENTS

General 1
Inspection 1
Reference 1
Approvals 1
Nomenclature 2

INSTALLATION

Limitations 3
Location 3
Condensate Drainage Precaution 3
Rigging and Handling 3
Clearances 3
Ductwork 3
Filters 4
Condensate Drain 4
Service Access 4
Blower Speed Selection 4
Disconnect Switch Bracket For Optional Belt-Drive 4
Compressors 4
Thermostat 4
Power and Control Wiring 4
Electric Heaters 5
Optional Economizer Rain Hood 6

OPERATION

Cooling System 12
Preliminary Operation Cooling 12
Cooling Sequence of Operation 12
Heating Sequence of Operation 12
Defrost Sequence of Operation 12
Lockout Control 13
Checking Supply Air CFM 13
Secure Owner's Approval 14

MAINTENANCE

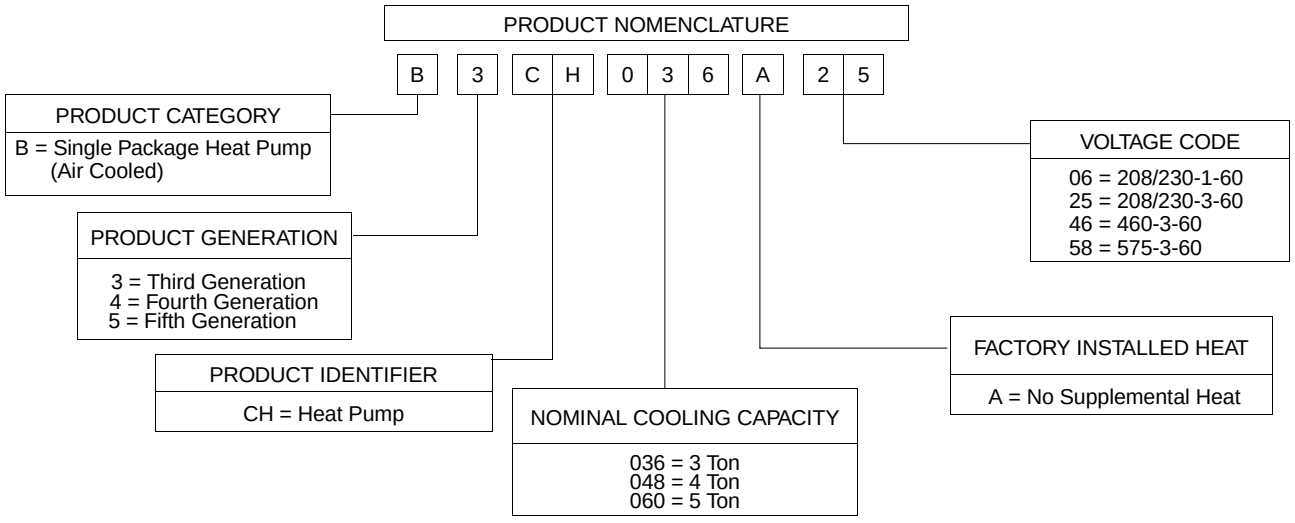
Normal Maintenance 14

TABLES

No.	Description	Page
1	Unit Application Data	3
2	Air Flow Limitations	5
3	Physical Data	7
4	Supply Air Perf. 3 & 4 Ton w/Belt-Drive Blower	9
5	Supply Air Perf. 5 Ton w/Belt-Drive Blower	10
6	Supply Air Perf. w/Direct-Drive Blower	10
7	Static Resistances	10
8	Motor and Drive Data - Belt-Drive Blower	11
9	Electrical Data w/Direct-Drive Blower	11
10	Electrical Data w/Belt-Drive Blower	11
11	Belt-Drive Supply Air Motor Pulley Adj.	13

FIGURES

No.	Description	Page
1	Center of Gravity	3
2	Recommended Drain Piping	4
3	Typical Field Wiring	5
4	Economizer Rain Hood Assembly	6
5	Adjusting Enthalpy Setpoint	7
6	Dimensions and Clearances	8
7	Defrost Initiation Times	12
8	Ambient Modified Time/Temp. Control	12
9	Hole Loc. for Press. Drop Readings	13
10	Press. Drop versus Supply Air CFM	13



INSTALLATION

These units must be installed in accordance with the current edition of the following national and local safety codes:

In U.S.A.:

1. National Electrical Code ANSI/NFPA No. 70.
2. Local electric utility requirements.

In Canada:

1. Canadian Electrical Code C22.1
2. Canadian Installation Codes CAN/CGA-B149.1 and .2.

Refer to Table 1 for Unit Application Data.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and / or the customer's expense.

Size of unit for proposed installation should be based on heat loss / heat gain calculation made according to the methods of Air Conditioning Contractors of America (ACCA).

LOCATION

TABLE 1 - UNIT APPLICATION DATA

Voltage Variation Min. / Max.*		208/230V	187 / 253
		460V	414 / 506
		575V	518 / 630
Cooling	Wet Bulb Temperature (°F) of Air on Indoor Coil, Min. / Max.		57 / 72
	Dry Bulb Temperature (°F) of Air on Outdoor Coil, Min. / Max.		45 / 120
Heating	Minimum Dry Bulb Temperature (°F) of Air on Outdoor Coil		-10

*Rated in accordance with ARI Standard 110, utilization range "A".

Use the following guidelines to select a suitable location for these units.

1. Unit is designed for outdoor installation only.
2. Outdoor coil must have an unlimited supply of air.
3. For ground level installation, a level pad or slab should be used. The thickness and size of the pad or slab used should meet local codes and unit weight. Do not tie the slab to the building foundation.
4. Roof structures must be able to support the weight of the unit and its options and / or accessories. Unit must be installed on a solid level roof curb or appropriate angle iron frame.

CAUTION: If a unit is to be installed on a roof curb or special frame other than a YORK roof curb, gasketing must be applied to all surfaces that come in contact with the unit underside.

5. Maintain level tolerance to 1/2" maximum across the entire length or width of the unit.
6. Elevate the unit sufficiently to prevent any blockage of the air entrances by snow in areas where there will be snow accumulation. Check the local weather bureau for the expected snow accumulation in your area.

OUTDOOR COIL CONDENSATE DRAINAGE PRECAUTION

Condensate will drain from the outdoor coil during the heating and defrost cycles. Normally this condensate may be allowed to drain directly onto the ground/roof. A gravel bed is recommended to prevent mud splashing.

WARNING: The unit should not be installed in an area where mud or ice could cause personal injury. Remember that condensate will drip from the outdoor coil during heat and defrost cycles and that this condensate will freeze when the temperature of the outdoor air is below 32°F.

RIGGING AND HANDLING

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreaders, whose length exceeds the largest dimension across the unit, MUST be used across the top of the unit.

BEFORE LIFTING A UNIT, MAKE SURE THAT ITS WEIGHT IS DISTRIBUTED EQUALLY ON THE CABLES SO THAT IT WILL LIFT EVENLY.

Units may also be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

LENGTH OF FORKS MUST BE A MINIMUM OF 42".

Remove the nesting brackets from the four corners on top of the unit. All screws that are removed when taking these brackets off must be replaced on the unit.

Refer to Table 3 for unit weights and to Figure 1 for approximate center of gravity.

CLEARANCES

All units require certain clearances for proper operation and

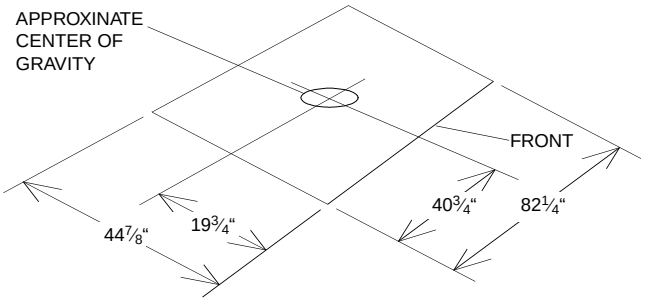


FIG. 1 - CENTER OF GRAVITY

service. Refer to Figure 6 for the clearances required for combustible construction, servicing, and proper unit operation.

WARNING: Do not permit overhanging structures or shrubs to obstruct outdoor air discharge outlet.

DUCTWORK

Ductwork should be designed and sized according to the methods in Manual Q of the Air Conditioning Contractors of America (ACCA).

A closed return duct system shall be used. This shall not preclude use of economizers or outdoor fresh air intake. The supply and return air duct connections at the unit should be made with flexible joints to minimize the transmission of noise.

The supply and return air duct systems should be designed for the CFM and static requirements of the job. They should NOT be sized to match the dimensions of the duct connections on the unit.

CAUTION: When fastening ductwork to the side duct flanges on the unit, insert the screws through the duct flanges only. DO NOT insert the screws through the

casing.
Outdoor ductwork must be insulated and water-proofed.

Refer to Figure 6 for information concerning side and bottom supply and return air duct openings.

FILTERS

1" filters are supplied with each unit. 2" replacement filters may be used with no modification to the filter racks. Filters must always be installed ahead of the evaporator coil and must be kept clean or replaced with same size and type. Dirty filters will reduce the capacity of the unit and will result in frosted coils or safety shutdown. Minimum filter area and required sizes are shown in Table 3.

CONDENSATE DRAIN

Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install a condensate drain line from the 3/4" PVC female connection on the unit to spill into an open drain.

NOTE: The condensate drain line MUST be trapped to provide proper drainage. See Figure 2.

SERVICE ACCESS

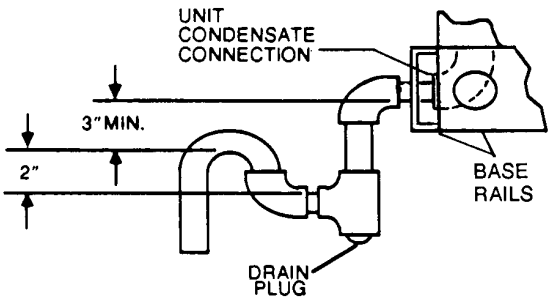


FIG. 2 - RECOMMENDED DRAIN PIPING

Access to all serviceable components is provided by the following removable panels:

- Compressor compartment
- Heater compartment
- Blower compartment
- Main control box
- Filter compartment
- Motor Access (on units w/belt-drive option)

Refer to Figure 6 for location of these access panels.

BLOWER SPEED SELECTION

Three blower motor speeds are available on the direct-drive units. The speed selection for the direct-drive units is determined by the CFM and ESP requirements of the applications. All units with belt-drive option have an adjustable motor pulley to achieve the above conditions.

All direct-drive units are shipped with the black wire (labeled #8) connected to the high speed tap on the blower motor. If a lower blower speed is desired, this wire should be moved to the medium or low speed tap on the motor.

DISCONNECT SWITCH BRACKET FOR UNITS WITH OPTIONAL BELT-DRIVE BRACKET

A special bracket for mounting a field-supplied disconnect switch is provided in each unit ordered with an optional belt-drive supply air blower. The bracket is shipped inside the blower compartment taped to the top of the blower housing. Install the bracket on the left hand side of the unit as shown in Figure 6. Several existing screws at the top of the unit and one approximately midway down from the top will be used for mounting the bracket. Screws should be loosened only - NOT REMOVED. Mounting holes in the bracket have elongated keyways allowing easy installation. Re-tighten screws after bracket is in place to ensure panels will remain leak tight.

COMPRESSORS

On some units the compressor is mounted on springs which have been tightened down for shipment only.

After this unit is installed, back out the compressor bolts until the sleeve clears the top grommet.

CAUTION: Do Not loosen compressor mounting bolts.

THERMOSTAT

The room thermostat should be located on an inside wall approximately 56" above the floor where it will not be subject to drafts, sun exposure, or heat from electrical fixtures or appliances. Follow manufacturer's instructions enclosed with thermostat for general installation procedure. Color coded insulated wires (#18 AWG) should be used to connect thermostat to unit. See Figure 3 for wiring details.

NOTE: On units with economizer, remove jumper "J1" from terminals 8 and 10 on plug connector J3/P7 on the relay board in the unit control box. Refer to the unit wiring labels located on the inside of the control box access panel.

An "Emergency Heat" position is provided with the thermostat. In the "Emergency Heat" position, the thermostat will allow electric resistance heat only. The compressor will be locked out. A pilot light on the thermostat will indicate that the switch is on "EM HT".

POWER AND CONTROL WIRING

Field wiring to the unit must conform to provisions of the National Electrical Code (NEC) ANSI/NFPA No. 70 (in U.S.A.), current Canadian Electrical Code (CEC) C22.1 (in Canada) and/or local ordinances. The unit must be electrically grounded in accordance with the NEC and CEC (as specified above) and/or local codes. Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit Rating Plate and Table 1.

The wiring harness furnished with this unit is an integral part of a UL and C.G.A. design certified unit. Field alteration to comply with electrical codes should not be required.

A disconnect switch should be field provided for the unit. The switch must be separate from all other circuits. Refer to Figure 6 for installation location. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram.

Electrical lines must be sized properly to carry the load. USE COPPER CONDUCTORS ONLY. Each unit must be wired with a separate branch circuit fed directly from the meter panel and properly protected.

CAUTION: When connecting electrical power and control wiring to the unit, waterproof type connectors MUST BE USED so that water or moisture cannot be drawn into the unit during normal operation. The above waterproofing conditions will also apply when installing a field-supplied disconnect switch.

Refer to Figure 3 for typical field wiring and to the appropriate unit wiring diagram for control circuit and power wiring information. Refer to Tables 9 and 10 for electrical data.

ELECTRIC HEATERS

Supplemental electric heaters may be ordered as a field-installed accessory. Refer to Form 530.18-N7.1V for installation instruction. These UL and C.G.A. approved heaters are located within the central compartment of the unit (see Figure 6 for access panel) with the heating elements extending into the supply air chamber.

Fuses are supplied, where required, by the factory. Some KW sizes require fuses and others do not. Refer to the electric heater accessory installation instruction for the heater electrical data.

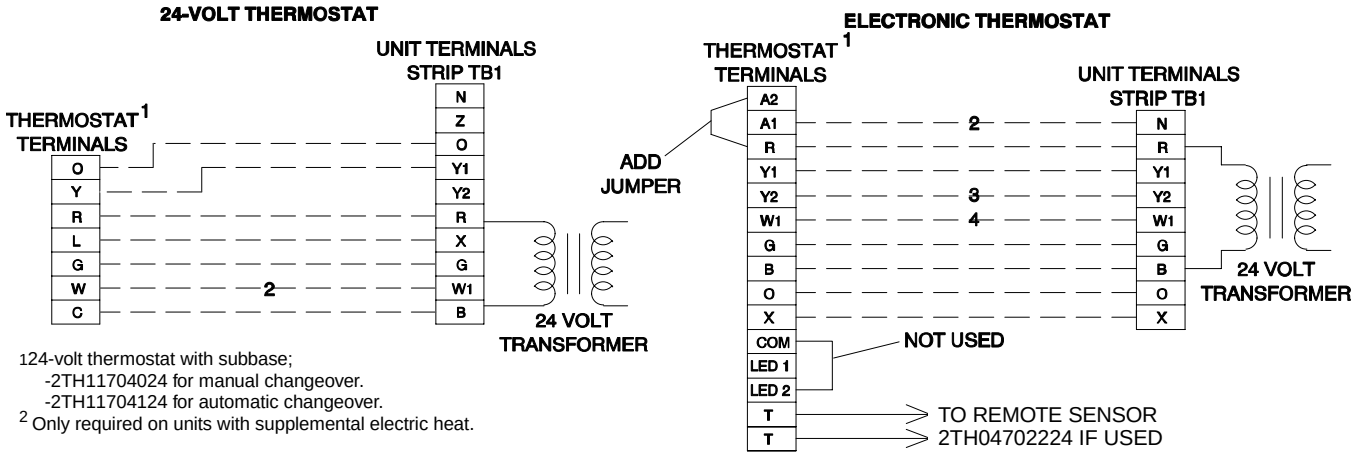
The minimum air flow limitations across these heaters are listed in Table 2.

TABLE 2 - AIR FLOW LIMITATIONS

NOMINAL HEATER SIZE KW	VOLTAGE[1]	UNIT MODEL SIZE, NOMINAL TONS		
		3	4	5
		MINIMUM SUPPLY AIR CFM		
5	208 / 230-1-60	1,100	1,300	1,600
7		1,100	1,300	1,600
10		1,200	1,300	1,600
15		1,200	1,300	1,600
20		1,300[2]	1,300[2]	1,600
30		–	–	1,600
5	208 / 230-3-60	1,100	1,300	1,600
7		1,100	1,300	1,600
10		1,200	1,300	1,600
15		1,200	1,300	1,600
20		1,300[2]	1,300	1,600
30		–	–	1,600
7	460-3-60	1,100	1,300	1,600
10		1,200	1,300	1,600
15		1,200	1,300	1,600
20		1,300	1,300	1,600
30		–	–	1,600
10	575-3-60	1,200	1,300	1,600
15		1,200	1,300	1,600
20		1,300	1,400	1,600
30		–	–	1,800

1208/230 and 460 volt heaters are UL approved.
208/230 and 575 volt heaters are CGA approved.
[2]CGA minimum is 1,400 CFM.

CONTROL WIRING



[1]24-volt thermostat with subbase;
-2TH11704024 for manual changeover.
-2TH11704124 for automatic changeover.
[2] Only required on units with supplemental electric heat.

[1]Electronic progammable thermostat 2ET04700324 with subbase for either manual or automatic changeover.
[2]Only required on units with economizer. Remove jumper L2 from terminals 4 and 9 on jumper plug P7. The outdoor air intake dampers will return to their fully closed position when the thermostat switches to the "unoccupied" mode.
[3]Second stage cooling may be used on units with economizer. Remove jumper J1 from terminals 8 and 10 on jumper plug connector P7.
[4]Only required on units with supplemental electric heat.

POWER WIRING

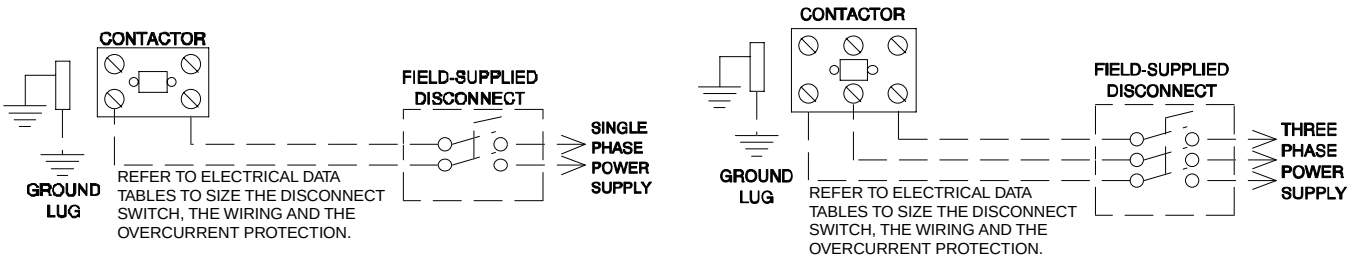

CONTACTOR
FIELD-SUPPLIED DISCONNECT
SINGLE PHASE POWER SUPPLY
GROUND LUG
REFER TO ELECTRICAL DATA TABLES TO SIZE THE DISCONNECT SWITCH, THE WIRING AND THE OVERCURRENT PROTECTION.
CONTACTOR
FIELD-SUPPLIED DISCONNECT
THREE PHASE POWER SUPPLY
GROUND LUG
REFER TO ELECTRICAL DATA TABLES TO SIZE THE DISCONNECT SWITCH, THE WIRING AND THE OVERCURRENT PROTECTION.

FIG. 3 - TYPICAL FIELD WIRING

OPTIONAL ECONOMIZER RAIN HOOD

The following procedure should be used when assembling an economizer rain hood onto a unit. Refer to Figure 4. The outdoor and return air dampers, damper actuator, the linkage and all the controls are factory mounted as part of the economizer option.

All of the hood components, including the filters, the gasketing and the hardware for assembling are located above the top filter racks within the filter section. The outdoor air sensor is in the bag of parts located at the bottom of the return air section.

1. With filter section access panel removed, take out hood components, filters and sensor described above. Remove and discard outdoor air opening cover on back unit (Upper right hand corner).

2. Remove the 1/2" knockout (A) in the units rear panel (located to the right side of the outdoor air opening). Insert the two loose wires from inside the unit, into the 1/2" bushing provided. Insert wires and bushing into knockout. Snap bushing into place.

3. Mount the outdoor air sensor to the rear panel, just below the knockout described in Step 2. Secure with two self-drilling screws at dimples (B) provided in the panel.

NOTE: Sensor must be positioned so that the sensing ports are at the top (louvers pointing downward) and terminal connections to the right.

4. Connect the two wires, indicated in Step 2, to the sensor as follows:

- Wire #73 to terminal (+)
- Wire #74 to terminal (S)

5. Assemble the LH and RH side plates to the top cover (2 screws each side) to form the hood. Apply gasketing to the flange surface on each side plate. Extend gasketing 1/4" beyond top and bottom of each flange to insure adequate corner sealing. Secure this assembly to the unit back panel (upper right hand corner). First, remove screw (C) on unit top cover. Then slip flange of hood cover in under flange of unit top cover, replace screw (C), engaging hole (E) in hood flange and tighten. Attach the two side plates to the unit panel by using two self-drilling screws for each side plate at dimples (D) provided in the panel.

6. Position fillpiece at bottom of hood, between the two side plates but do not secure at this time. (Slotted openings MUST be downward for drainage). After fillpiece is properly positioned, note where contact is made with the unit panel. Remove fillpiece and apply gasket material to this area to provide a seal. Reposition fillpiece and secure with 2 screws.

7. Install the two filters into the hood assembly, sliding down along retainers on side plates, into fillpiece at bottom of hood.

NOTE: Install filters so that "Air Flow" arrows point toward the unit.

8. Install filter cover over the end of the hood with one screw (center of hood), securing filters into position.

CAUTION: When proceeding with steps 9 and 10, extreme care must be exercised while turning both the set point and minimum position adjusting screws to prevent twisting them off.

9. The enthalpy set point for the dampers may now be set by selecting the desired set-point from graph in Figure 5. For a single enthalpy economizer, carefully turn the set-point adjusting screw to the "A", "B", "C" or "D" setting corresponding to the lettered curve. For a dual enthalpy economizer, carefully turn the set-point adjusting screw fully clockwise past the "D" setting.

10. To check that the damper blades move smoothly without binding, carefully turn the minimum position adjusting screw fully clockwise and then energize and de-energize terminals "R" to "G". With terminals "R" to "G" energized, turn the minimum position screw counterclockwise until the desired minimum position has been attained.

11. Replace the filter section access panel.

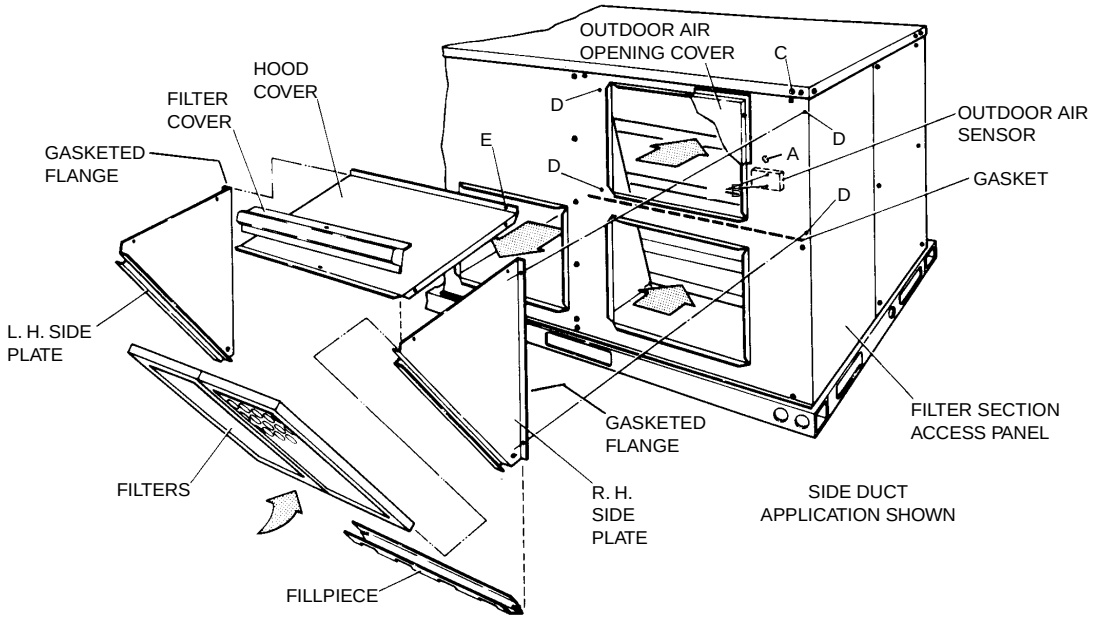


FIG. 4 - ECONOMIZER RAIN HOOD ASSEMBLY (OPTION)

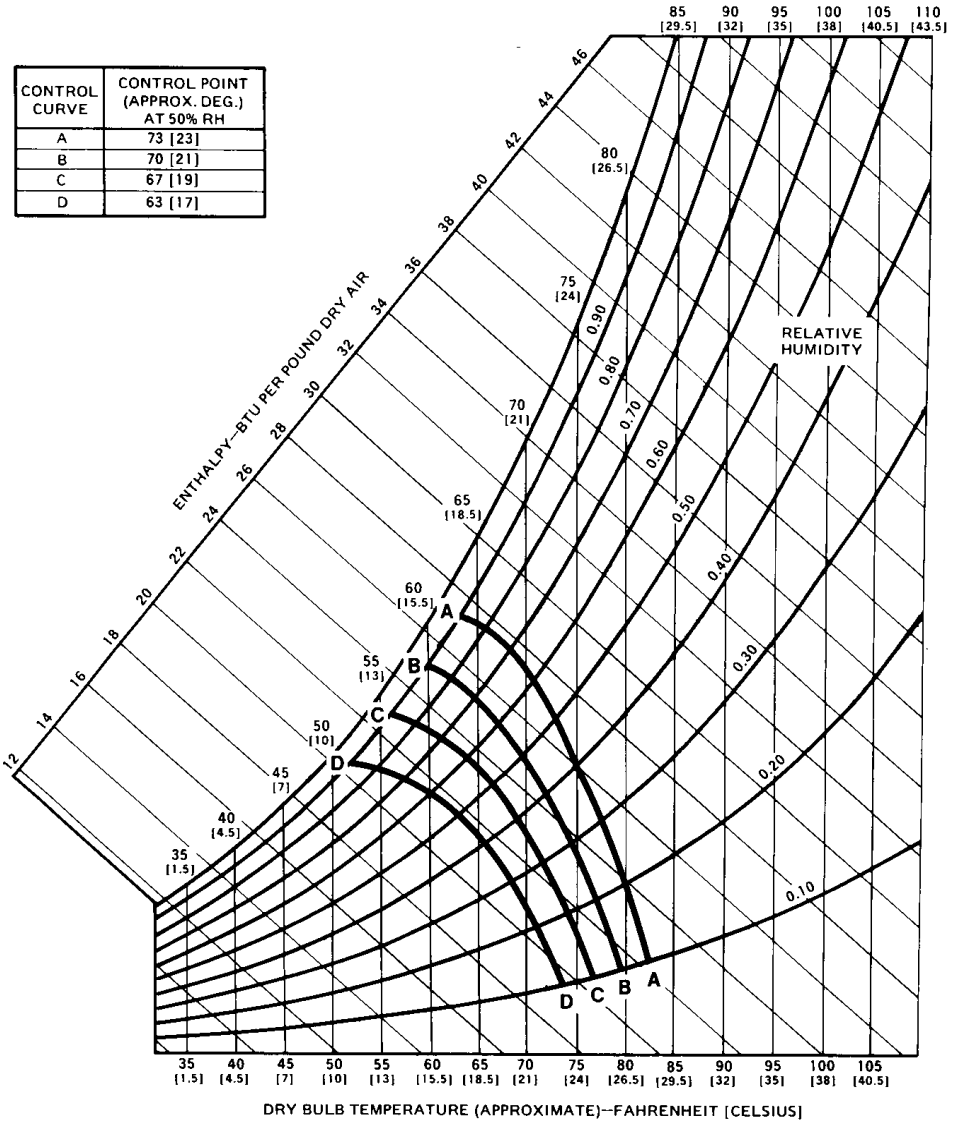


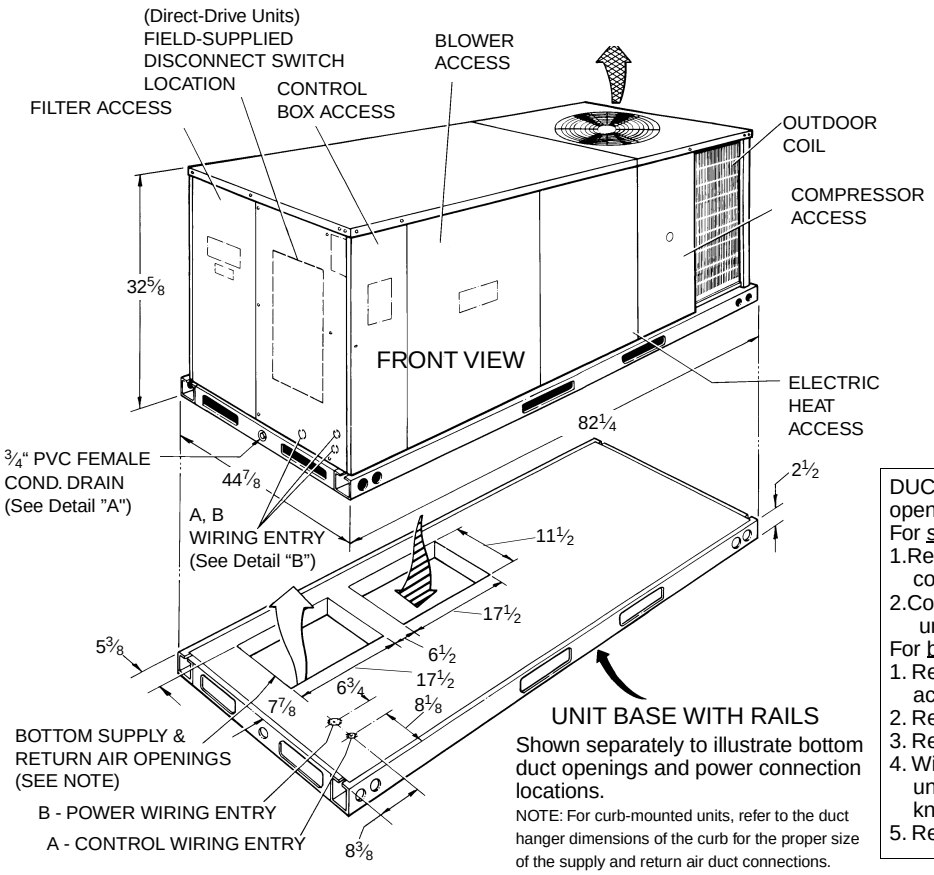
FIG. 5 - ENTHALPY SET POINT ADJUSTMENT

TABLE 3 - PHYSICAL DATA

MODELS		BCH 036	BCH 048	BCH 060
SUPPLY AIR BLOWER	CENTRIFUGAL BLOWER (Dia. x Wd. in.)	12 x 10	12 x 10	12 x 10
	FAN MOTOR HP (Direct-Drive Units)	½	¾	1
	FAN MOTOR HP (Belt-Drive Units)	1.5	1.5	1.5
INDOOR COIL	ROWS DEEP	4	3	3
	FINS PER INCH	16	15	15
	FACE AREA (Sq. Ft.)	4.3	5.1	5.1
OUTDOOR FAN	PROPELLER DIA. (in.)	22	22	24
	FAN MOTOR HP	⅓	½	½
	NOM. CFM TOTAL	4,300	4,200	4,500
OUTDOOR COIL	ROWS DEEP	1	1	1
	FINS PER INCH	20	20	20
	FACE AREA (Sq. Ft.)	17.1	17.1	17.1
AIR FILTERS (SEE NOTE)	QUANTITY PER UNIT (15" x 20" x 1")	2	2	2
	QUANTITY PER UNIT (14" X 25" X 1")	1	1	1
	TOTAL FACE AREA (sq. ft.)	6.3	6.3	6.3
CHARGE	REFRIGERANT 22 (lbs./oz.)	7/12	8/4	8/4
COMPRESSOR	HERMETIC, RECIPRICATING (Qty)	1	1	1

NOTE: Filter racks are adapted for 1" or 2" thick filters.

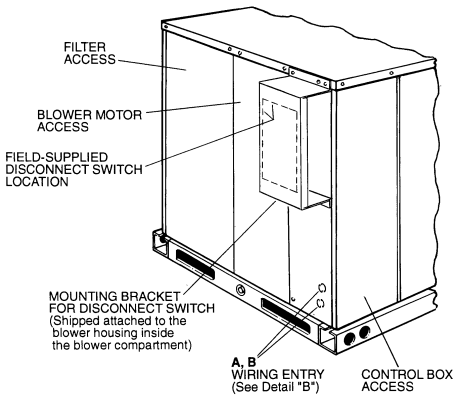
WEIGHTS (LBS)		
Basic Unit	3 Ton	555
	4 Ton	595
	5 Ton	620
OPTIONS / ACCESSORIES		
Electric Heat (Nominal KW)	5 - 7 KW	18
	10 - 15 KW	23
	20 - 30 KW	28
Economizer		50
Belt-Drive Blower		5
Motorized Outdoor Air Damper		26
Barometric Relief/Fixed Outdoor Air Intake Damper		10
Roof Mounting Curb		92



UNIT BASE WITH RAILS

Shown separately to illustrate bottom duct openings and power connection locations.

NOTE: For curb-mounted units, refer to the duct hanger dimensions of the curb for the proper size of the supply and return air duct connections.



DISCONNECT SWITCH LOCATION AND MOTOR ACCESS PANEL FOR UNIT WITH "BELT-DRIVE" OPTION

DUCT COVERS - Units are shipped with all air duct openings covered.

For side duct applications;

1. Remove and discard the supply and return air duct covers.
2. Connect ductwork to duct flanges on the rear of the unit.

For bottom duct applications;

1. Remove the side supply air duct cover to gain access to the bottom supply air knockout panel.
2. Remove and discard the bottom knockout panel.
3. Replace the side duct cover.
4. With filter section access panel removed from the unit, remove and discard the bottom return air knockout panel.
5. Replace the filter access panel.

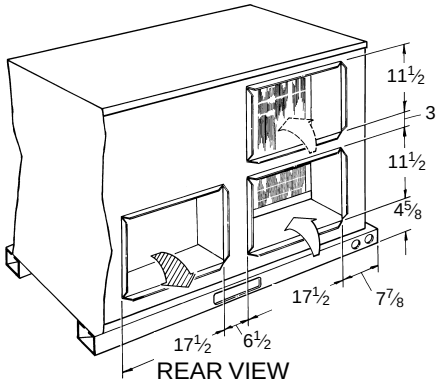
CLEARANCES

Front	24"
Back	12" (Less Economizer) 36" (With Economizer or Fixed Air/Motorized Damper)
Left Side (Filter Access)	24" (Less Economizer) 36" (With Economizer)
Right Side (OD Coil)	24"
Below Unit[1]	0"
Above Unit[2]	72" (For Outdoor Air Discharge)

NOTE:
Units and ductwork are approved for zero clearance to combustible materials when equipped with electric heaters.

[1] Units may be installed on combustible floors made from wood or class A, B or C roof covering material. (Applicable in USA only).

[2] Units must be installed oudoors. Overhanging structures or shrubs should not obstruct the outdoor coil nor the fan outlet.



SIDE SUPPLY AND RETURN AIR OPENINGS

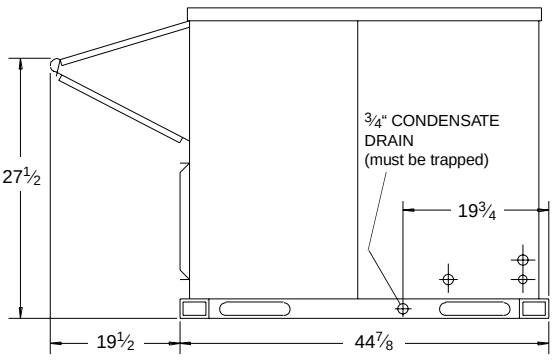
All dimensions are in inches. They are subject to change without notice. Certified dimensions will be provided upon request.

UTILITIES ENTRY DATA

HOLE	KNOCKOUT SIZE (DIA.)	USED FOR
A	7/8" *	Control Wiring (Side or Bottom)**
B	2" *	Power Wiring (Side or Bottom)

*Knockouts in the bottom of the unit can be located by the slice in the insulation.

**Do not remove the 2" knockout ring.



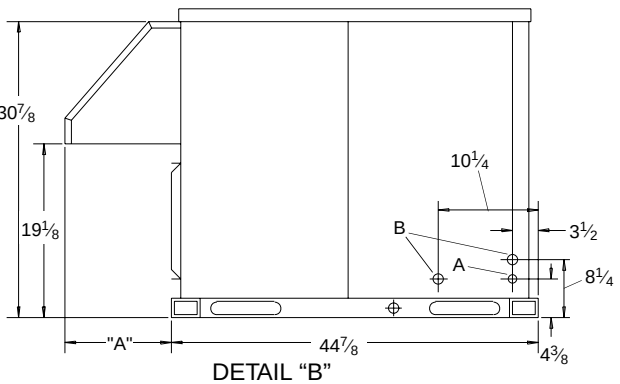
DETAIL "A"

UNIT WITH ECONOMIZER RAIN HOOD

AIR FLOW LEGEND

- RETURN AIR
- SUPPLY AIR
- OUTDOOR AIR
- OUTDOOR AIR (Economizer)

DIMENSION "A"	
FIXED OUTDOOR AIR DAMPER	12
MOTORIZED DAMPER	16 1/2



DETAIL "B"

UNIT WITH FIXED OUTDOOR AIR/MOTORIZED DAMPER RAIN HOOD

FIG. 6 - DIMENSIONS & CLEARANCES - 3, 4 & 5 TONS

TABLE 4 - SUPPLY AIR PERFORMANCE - 3 & 4 Ton Units w/Belt-Drive Blower

3 TON - SIDE DUCT CONNECTIONS @230/460/575 Volts

MODEL BCH	AIR FLOW CFM	Available External Static Pressure - IWG*													
		0.20		0.30		0.40		0.50		0.60		0.70		0.80	
		RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
036	2000	843	860	880	925	919	1005	956	1065	993	1145	1030	1195	1067	1235
	1900	817	775	854	850	893	920	930	995	970	1065	1008	1125	1046	1170
	1800	790	700	828	760	867	840	906	905	944	980	985	1040	1025	1100
	1700	-	-	802	670	840	745	881	815	920	900	961	970	1001	1030
	1600	-	-	-	-	818	665	858	740	898	820	940	890	980	950
	1500	-	-	-	-	-	-	842	695	882	755	922	835	962	895
	1400	-	-	-	-	-	-	833	650	867	705	904	765	942	820
	1300	-	-	-	-	-	-	-	-	858	665	893	725	932	785
	1200	-	-	-	-	-	-	-	-	847	640	880	680	916	730

MODEL BCH	AIR FLOW CFM	Available External Static Pressure - IWG*													
		0.90		1.00		1.10		1.20		1.30		1.40		1.50	
		RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
036	2000	1103	1270	-	-	-	-	-	-	-	-	-	-	-	-
	1900	1085	1210	-	-	-	-	-	-	-	-	-	-	-	-
	1800	1064	1145	1102	1180	-	-	-	-	-	-	-	-	-	-
	1700	1040	1075	1081	1115	1121	1140	-	-	-	-	-	-	-	-
	1600	1020	1005	1060	1050	1100	1085	-	-	-	-	-	-	-	-
	1500	1003	945	1044	995	1086	1035	-	-	-	-	-	-	-	-
	1400	982	880	1024	920	1067	965	1107	1000	-	-	-	-	-	-
	1300	970	835	1010	870	1053	920	1099	960	-	-	-	-	-	-
	1200	953	780	992	815	1034	855	1080	905	-	-	-	-	-	-

NOTE: FOR 208 VOLTS, MULTIPLY VALUES BY 0.95.

*INCLUDES ALLOWANCES FOR A WET INDOOR COIL AND 1" FILTERS. REFER TO TABLE 7 FOR RESISTANCE VALUES ON APPLICATIONS OTHER THAN HEAT PUMP UNITS WITH SIDE DUCT AIRFLOWS.

4 TON - SIDE DUCT CONNECTIONS @ 230/460/575 Volts

MODEL BCH	AIR FLOW CFM	Available External Static Pressure - IWG*													
		0.20		0.30		0.40		0.50		0.60		0.70		0.80	
		RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
048	2000	843	860	880	925	919	1005	956	1065	993	1145	1030	1195	1067	1235
	1900	817	775	854	850	893	920	930	995	970	1065	1008	1125	1046	1170
	1800	790	700	828	760	867	840	906	905	944	980	985	1040	1025	1100
	1700	-	-	802	670	840	745	881	815	920	900	961	970	1001	1030
	1600	-	-	-	-	818	665	858	740	898	820	940	890	980	950
	1500	-	-	-	-	-	-	842	695	882	755	922	835	962	895
	1400	-	-	-	-	-	-	833	650	867	705	904	765	942	820
	1300	-	-	-	-	-	-	-	-	858	665	893	725	932	785
	1200	-	-	-	-	-	-	-	-	847	640	880	680	916	730

MODEL BCH	AIR FLOW CFM	Available External Static Pressure - IWG*													
		0.90		1.00		1.10		1.20		1.30		1.40		1.50	
		RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
048	2000	1103	1270	-	-	-	-	-	-	-	-	-	-	-	-
	1900	1085	1210	-	-	-	-	-	-	-	-	-	-	-	-
	1800	1064	1145	1102	1180	-	-	-	-	-	-	-	-	-	-
	1700	1040	1075	1081	1115	1121	1140	-	-	-	-	-	-	-	-
	1600	1020	1005	1060	1050	1100	1085	-	-	-	-	-	-	-	-
	1500	1003	945	1044	995	1086	1035	-	-	-	-	-	-	-	-
	1400	982	880	1024	920	1067	965	1107	1000	-	-	-	-	-	-
	1300	970	835	1010	870	1053	920	1099	960	-	-	-	-	-	-
	1200	953	780	992	815	1034	855	1080	905	-	-	-	-	-	-

NOTE: FOR 208 VOLTS, MULTIPLY VALUES BY 0.95.

*INCLUDES ALLOWANCES FOR A WET INDOOR COIL AND 1" FILTERS. REFER TO TABLE 7 FOR RESISTANCE VALUES ON APPLICATIONS OTHER THAN HEAT PUMP UNITS WITH SIDE DUCT AIRFLOWS.

TABLE 5 - SUPPLY AIR PERFORMANCE - 5 Ton w/Belt-Drive Blower

5 TON - SIDE DUCT CONNECTIONS @ 230/460/575 Volts

MODEL BHN	AIR FLOW CFM	Available External Static Pressure - IWG*													
		0.20		0.30		0.40		0.50		0.60		0.70		0.80	
		RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
060	2500	1059	1560	1077	1590	1095	1630	1114	1650	1134	1660	1158	1685	1181	1720
	2400	1032	1405	1054	1470	1074	1525	1094	1560	1116	1595	1140	1620	1167	1640
	2300	1005	1260	1024	1275	1049	1370	1069	1440	1090	1475	1116	1505	1142	1535
	2200	980	1160	1002	1170	1022	1190	1044	1250	1066	1350	1090	1410	1117	1440
	2100	930	1060	957	1070	983	1080	1010	1100	1039	1160	1064	1260	1092	1340
	2000	877	950	908	975	941	1000	976	1020	1009	1050	1040	1100	1070	1225
	1900	-	-	-	-	894	885	940	940	980	980	1014	1020	1047	1095
	1800	-	-	-	-	855	815	903	860	950	905	988	940	1022	970
	1700	-	-	-	-	-	-	884	815	925	850	964	880	1001	910
	1600	-	-	-	-	-	-	864	770	908	805	948	835	987	870
	1500	-	-	-	-	-	-	-	-	882	740	926	780	965	830

MODEL BCH	AIR FLOW CFM	Available External Static Pressure - IWG*													
		0.90		1.00		1.10		1.20		1.30		1.40		1.50	
		RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
060	2500	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2400	1193	1665	-	-	-	-	-	-	-	-	-	-	-	-
	2300	1170	1580	1202	1620	-	-	-	-	-	-	-	-	-	-
	2200	1148	1480	1180	1530	-	-	-	-	-	-	-	-	-	-
	2100	1121	1385	1155	1425	1190	1475	-	-	-	-	-	-	-	-
	2000	1100	1285	1133	1340	1169	1385	1205	1445	-	-	-	-	-	-
	1900	1079	1180	1110	1240	1143	1280	1178	1330	1222	1375	-	-	-	-
	1800	1058	1060	1090	1135	1122	1190	1158	1240	1196	1295	-	-	-	-
	1700	1035	960	1071	1030	1103	1100	1134	1140	1164	1175	1197	1205	-	-
	1600	1020	900	1056	965	1088	1035	1118	1065	1145	1105	1170	1130	1198	1150
	1500	1004	860	1038	880	1070	925	1101	980	1130	1045	1158	1075	1184	1110

NOTE: FOR 208 VOLTS, MULTIPLY VALUES BY 0.95.

*INCLUDES ALLOWANCES FOR A WET INDOOR COIL AND 1" FILTERS. REFER TO TABLE 7 FOR RESISTANCE VALUES ON APPLICATIONS OTHER THAN HEAT PUMP UNITS WITH SIDE DUCT AIRFLOWS.

TABLE 6 - SUPPLY AIR PERFORMANCE - 3, 4 & 5 Ton w/Direct-Drive Blower

230 / 460 / 575 VOLTS - SIDE DUCT APPLICATIONS

MODEL BCH	MOTOR SPEED	Available External Static Pressure - IWG*																	
		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
		CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts
036	HI	-	-	-	-	-	-	1720	825	1665	795	1600	765	1540	735	1490	700	1380	670
	MED	1660	850	1630	820	1590	780	1550	750	1500	720	1450	690	1400	665	1360	650	1270	610
	LOW	1470	750	1440	725	1410	700	1370	675	1330	650	1290	625	1250	610	1220	600	1130	560
048	HI	-	-	-	-	2000	1010	1950	975	1905	945	1840	910	1770	825	1660	825	1530	775
	MED	1810	910	1780	880	1740	850	1700	825	1665	800	1620	775	1560	740	1480	700	1390	660
	LOW	1635	810	1610	780	1580	760	1555	740	1540	730	1510	715	1460	690	1400	660	1300	615
060	HI	-	-	-	-	2500	1400	2420	1350	2340	1300	2260	1250	2160	1190	2060	1135	1925	1065
	MED	2390	1350	2350	1300	2300	1255	2245	1210	2190	1165	2130	1120	2065	1075	1990	1030	1900	970
	LOW	2270	1320	2230	1270	2190	1220	2145	1170	2090	1110	2030	1070	1960	1020	1890	970	1810	920

NOTE: FOR 208 VOLTS, MULTIPLY VALUES BY 0.95.

*INCLUDES ALLOWANCES FOR A WET INDOOR COIL AND 1" FILTERS. REFER TO TABLE 7 FOR RESISTANCE VALUES ON APPLICATIONS OTHER THAN HEAT PUMP UNITS WITH SIDE DUCT AIRFLOWS.

TABLE 7 - STATIC RESISTANCES*

EXTERNAL STATIC PRESSURE DROP

DESCRIPTION		RESISTANCE, IWG CFM								
		1000	1200	1400	1600	1800	2000	2200	2400	2600
Economizer[1, 2]		0.07	0.08	0.09	0.11	0.13	0.15	0.17	0.20	0.23
Electric Heaters[1]	5 - 15 KW	0.04	0.05	0.06	0.07	0.08	0.10	0.12	0.14	0.16
	20 - 30 KW	0.06	0.07	0.08	0.09	0.11	0.13	0.15	0.17	0.20
Bottom Duct Connections[1]		0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.14	0.16

[1]Deduct these resistance values from the available external static pressure shown in the respective Blower Performance Table.
[2]The pressure thru the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct system is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

TABLE 8 - MOTOR AND DRIVE DATA w/Belt-Drive Blower

MODEL	BLOWER RANGE (RPM)	MOTOR*				ADJUSTABLE MOTOR PULLEY		FIXED BLOWER PULLEY		BELT	
		HP	RPM	FRAME SIZE	SERVICE FACTOR	PITCH DIA. (in.)	BORE (in.)	PITCH DIA. (in.)	BORE (in.)	PITCH LENGTH (in.)	DESIG-NATION
BCH 036	790 - 1120	1-1/2	1725	56	1.15	2.4 - 3.4	7/8	5.7	1	37.3	A36
BCH 048	790 - 1120	1-1/2	1725	56	1.15	2.4 - 3.4	7/8	5.7	1	37.3	A36
BCH 060	850 - 1220	1-1/2	1725	56	1.15	2.4 - 3.4	7/8	5.2	1	37.3	A36

*All motors have solid bases and are inherently protected. These motors can be selected to operate into their service factor because they are located in the moving air, upstream of any heating device.

TABLE 9 - ELECTRICAL DATA w/Direct-Drive Blower Motor

MODEL BCH	POWER SUPPLY	VOLTAGE LIMITATIONS (SEE NOTE 1)		COMPRESSOR		OUTDOOR FAN MOTOR, FLA	SUPPLY AIR BLOWER MOTOR, FLA	MINIMUM CIRCUIT AMPACITY	MAX. FUSE SIZE, (SEE NOTE 2) AMPS	MAX. HACR BREAKER SIZE, AMPS
		MIN.	MAX.	RLA	LRA					
036	208/230-1-60	187	253	19.0	105	1.7	4.4	29.9	45	45
	208/230-3-60	187	253	11.9	85	1.7	4.4	21.0	30	30
	460-3-60	414	504	5.9	42	1.0	2.2	10.6	15	15
	575-3-60	518	630	4.8	34	1.0	2.2	10.2	15	15
048	208/230-1-60	187	253	23.1	105	2.3	5.0	36.1	50	50
	208/230-3-60	187	253	14.7	130	2.3	5.0	25.7	40	40
	460-3-60	414	504	7.7	64	1.4	2.2	13.2	20	20
	575-3-60	518	630	6.4	52	1.4	2.2	11.6	15	15
060	208/230-1-60	187	253	32.1	169	2.3	6.6	49.0	80	80
	208/230-3-60	187	253	19.3	137	2.3	6.6	33.0	50	50
	460-3-60	414	504	10.0	62	1.4	3.3	17.2	25	25
	575-3-60	518	630	7.9	50	1.4	3.3	14.6	20	20

NOTES: 1. Rated in accordance wtih ARI Standard 110, utilizatin range "A".
2. Dual element, time delay type.

TABLE 10 - ELECTRICAL DATA w/Belt-Drive Blower Motor

MODEL BCH	POWER SUPPLY	VOLTAGE LIMITATIONS (SEE NOTE 1)		COMPRESSOR		OUTDOOR FAN MOTOR, FLA	SUPPLY AIR BLOWER MOTOR, FLA	MINIMUM CIRCUIT AMPACITY	MAX. FUSE SIZE, (SEE NOTE 2) AMPS	MAX. HACR BREAKER SIZE, AMPS
		MIN.	MAX.	RLA	LRA					
036	208/230-1-60	187	253	19.0	105	1.7	5.3	34.8	45	45
	208/230-3-60	187	253	11.9	85	1.7	5.3	21.9	30	30
	460-3-60	414	504	5.9	42	1.0	3.1	11.5	15	15
	575-3-60	518	630	4.8	34	1.0	3.1	11.1	15	15
048	208/230-1-60	187	253	23.1	105	2.3	8.6	39.7	50	50
	208/230-3-60	187	253	14.7	130	2.3	5.2	25.9	40	40
	460-3-60	414	504	7.7	64	1.4	2.6	13.6	20	20
	575-3-60	518	630	6.4	52	1.4	2.0	11.4	15	15
060	208/230-1-60	187	253	32.1	169	2.3	8.6	51.0	80	80
	208/230-3-60	187	253	19.3	137	2.3	6.0	32.4	50	50
	460-3-60	414	504	10.0	62	1.4	3.0	16.9	25	25
	575-3-60	518	630	7.9	50	1.4	2.4	13.7	20	20

NOTES: 1. Utilization Range “A” in accordance with ARI Standard 110.
2. Dual element, time delay type.

OPERATION

COOLING SYSTEM

The unit has an air-cooled condenser and is factory-charged with Refrigerant-22.

The compressor is hermetically sealed, internally sprung, mounted on spring isolators and inherently (internally) protected. If there is an abnormal temperature rise in the compressor, the protector will open to shut down the compressor.

PRELIMINARY OPERATION COOLING

After the installation has been completed, the crankcase heater of the compressor must be energized for at least 4 hours before starting the unit. After this initial warm-up, the compressor should be given three false starts (energized just long enough to make a few revolutions) with a 5 minute delay between each start before being put into full time service.

NOTE: Prior to each cooling season, the crankcase heater must be energized at least 10 hours before the system is put into operation.

COOLING SEQUENCE OF OPERATION

When the thermostat calls for cooling, the compressor and the outdoor fan motor will be energized through terminal "Y1" and the supply air blower motor will be energized through terminal "G" (if the fan switch on the subbase is set in the "AUTO" position). The supply air blower motor will run continuously if the fan switch is set in the "ON" position.

The reversing valve is energized thru the "O" circuit when the subbase is in the cooling mode.

HEATING SEQUENCE OF OPERATION

The following sequence of operation is based on using a standard YORK heat pump thermostat with two heating stages.

FIRST STAGE HEAT

When the thermostat calls for heating, the compressor and the outdoor fan motor will be energized through terminal "Y1" and the supply air blower motor will be energized through terminal "G" (if the fan switch on the subbase is set in the "AUTO" position). The supply air blower motor will run continuously if the fan switch is set in the "ON" position.

SECOND STAGE HEAT

If compressor operation can not satisfy the heating requirements, second stage heat will energize supplemental electric heat (if supplied) thru the "W1" circuit.

DEFROST SEQUENCE OF OPERATION

The BCH has a unique “ambient modified” time-temperature defrost control that automatically adjusts to changes in the outdoor temperature. The defrost control will shorten the defrost initiation time periods above 35°F and will extend the defrost initiation time periods below 35°F. The control is factory set to defrost at 110 minutes (T3), but it can be field adjusted to defrost at 80 minutes (T2) or 50 minutes (T1) in areas with high humidity.

The curve in Figure 7 shows how defrost initiation times are automatically compensated for changes in outdoor temperature.

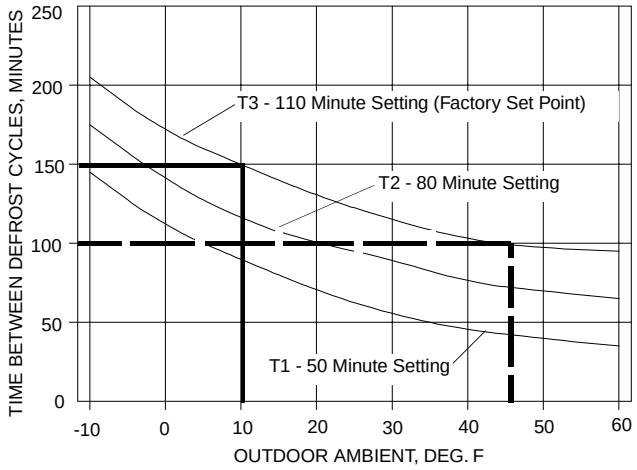


FIG. 7 - DEFROST INITIATION TIMES

EXAMPLE: If the time is factory set on pin T-3 (110 minutes at 35°F outdoor) and the outdoor temperature climbs to 45°F, the time initiation cycle will decrease to every 100 minutes.

If the outdoor temperature drops to 10°F where ice is less likely to form, the 110 minute interval will extend to every 150 minutes.

Two requirements must be met before a defrost cycle can be initiated.

1. The defrost time cycle must be complete.

2. The liquid line temperature must be less than 28°F.

Defrost will terminate when the liquid line sensor reaches 55°F or after 10 minutes.

The defrost time cycle will restart 10 minutes after the start of the defrost cycle even though the liquid sensor terminated defrost after 3 minutes.

During troubleshooting, the defrost time can be reduced to 20 seconds by shorting out the SW1 test pegs on the module. The pegs are 1/2" long, 3/16" apart and are mounted on a white base. See Figure 8.

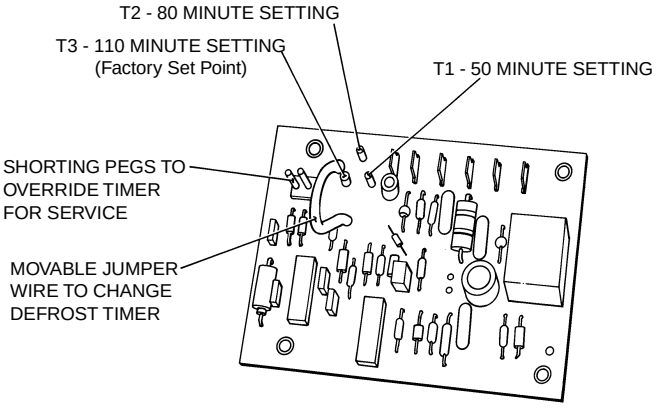


FIG. 8 - AMBIENT MODIFIED TIME/TEMPERATURE CONTROL

LOCKOUT CONTROL

Any one of four conditions will put the system into a lock-out condition during the heating or cooling mode:

1. The discharge line temperature reaches 255°F (215°F reset) or,
2. The discharge pressure reaches 398 PSIG (310 PSIG reset) or,
3. The suction line freezestat equals 26°F (38°F reset) or,
4. The low-pressure cut-out equals 7 PSIG (22 PSIG reset).

A lock-out will energize the emergency heat light on the thermostat and the red LED light on the unit relay board. Turning the thermostat switch to "Off" then back to "On", will reset the system.

NOTICE TO OWNER:

If a lockout occurs, check for the following problems before calling a serviceman:

1. Dirty filters.
2. Snow accumulation.
3. Leaf or debris blockage.

After eliminating the problem, attempt to restart the system as follows:

- turn the system switch on the thermostat to its "OFF" position for 10 seconds.
- turn it back to its original position.

If the unit doesn't start, call a serviceman.

NOTE: Models with an anti-recycle accessory will have a 5-minute delay before starting.

CHECKING SUPPLY AIR CFM

The speed of the supply air blower will depend on the required CFM, the unit accessories and the static resistances of both the supply and the return air duct systems. With this information, the speed for the supply air blower can be determined from the blower performance and static resistance data on Tables 4 through 7.

TABLE 11 - BELT-DRIVE SUPPLY AIR MOTOR PULLEY ADJUSTMENT

TURNS OPEN*	BLOWER DRIVE RANGE (RPM)		
	3 TON	4 TON	5 TON
5	780	790	850
4	842	856	924
3	904	922	998
2	966	988	1072
1	1028	1054	1246
0	1090	1120	1220

*Pulley can be adjusted in half-turn increments.

Knowing the required blower RPM and the blower motor HP, the speed setting for the supply air motor can be determined.

The setting (turns open) for the optional belt-drive supply air pulley can be determined from Table 11.

OPTIONAL BELT-DRIVE BLOWER

All units with belt-drive blowers have single speed motors. The variable pitch pulley on the blower motor can be adjusted to obtain the desired supply air CFM. Refer to Table 8 for blower motor drive data. The tension on the belts should be adjusted as shown in Figure 9.

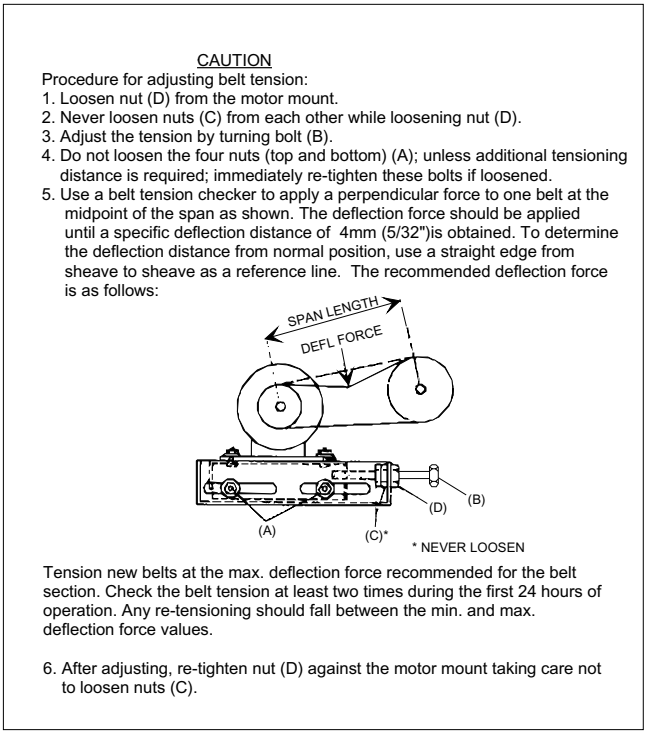

CAUTION
Procedure for adjusting belt tension:
1. Loosen nut (D) from the motor mount.
2. Never loosen nuts (C) from each other while loosening nut (D).
3. Adjust the tension by turning bolt (B).
4. Do not loosen the four nuts (top and bottom) (A); unless additional tensioning distance is required; immediately re-tighten these bolts if loosened.
5. Use a belt tension checker to apply a perpendicular force to one belt at the midpoint of the span as shown. The deflection force should be applied until a specific deflection distance of 4mm (5/32")is obtained. To determine the deflection distance from normal position, use a straight edge from sheave to sheave as a reference line. The recommended deflection force is as follows:
SPAN LENGTH
DEFL FORCE
(A)
(B)
(C)*
(D)
* NEVER LOOSEN
Tension new belts at the max. deflection force recommended for the belt section. Check the belt tension at least two times during the first 24 hours of operation. Any re-tensioning should fall between the min. and max. deflection force values.
6. After adjusting, re-tighten nut (D) against the motor mount taking care not to loosen nuts (C).

FIG. 9 - BELT ADJUSTMENT

Start the supply air blower motor. Adjust the resistances in both the supply and the return air duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

To check the supply air CFM after the initial balancing has been completed:

1. Remove the (two) $5/16$" dot plugs from the holes located on the filter access panel side of the unit.
2. Insert at least 8" of 1/4 inch tubing into each of these holes for sufficient penetration into the air flow on both sides of the indoor coil.

NOTE: The tubes must be inserted and held in a position perpendicular to the air flow so that velocity pressure will not affect the static pressure readings.

3. Using an inclined manometer, determine the pressure drop across a dry indoor coil. Since the moisture on an indoor coil may vary greatly, measuring the pressure drop across a wet coil under field conditions would be inaccurate. To ensure a dry coil, the compressors should be de-energized while the test is being run.
4. Knowing the pressure drop across a dry coil, the actual CFM through the unit can be determined from the curve in Figure 10.

WARNING: Failure to properly adjust the total system air quantity can result in poor system performance.

After readings have been obtained, remove the tubes and seal the drilled holes in the side panels. 5/16" dot plugs (P/N 029-13880) are available through normal parts ordering procedures.

NOTE: DE-ENERGIZE THE COMPRESSORS BEFORE TAKING ANY TEST MEASUREMENTS TO ENSURE A DRY INDOOR COIL.

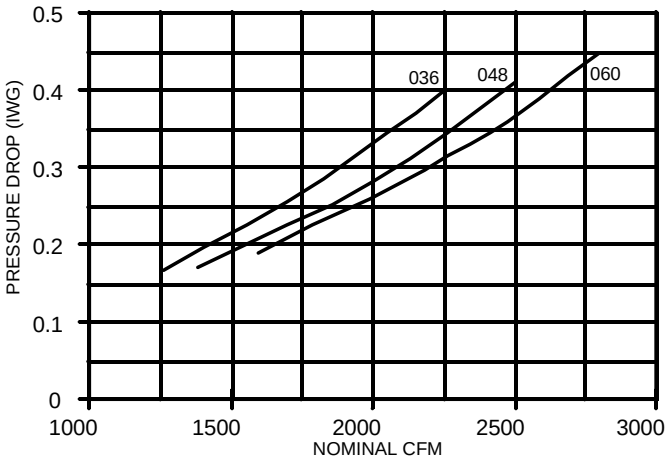


FIG. 10 - PRESSURE DROP ACROSS A DRY INDOOR COIL VS. SUPPLY AIR CFM

SECURE OWNER'S APPROVAL: *When the system is functioning properly, secure the owner's approval. Show him the location of all disconnect switches and the thermostat. Teach him how to start and stop the unit and how to adjust temperature settings within the limitations of the system.*

MAINTENANCE

NORMAL MAINTENANCE

CAUTION: Prior to any of the following maintenance procedures, shut off all power to the unit to prevent personal injury.

FILTERS - Inspect once a month. Replace disposable or clean permanent type as necessary. DO NOT replace permanent type with disposable.

MOTORS - Indoor fan and outdoor fan motors are permanently lubricated and require no maintenance.

OUTDOOR COIL - Dirt should not be allowed to accumulate on the outdoor coil surface or other parts in the air circuit. Cleaning should be as often as necessary to keep coil clean. Use a brush, vacuum cleaner attachment, or other suitable means. If water is used to clean coil, be sure power to the unit is shut off prior to cleaning.

NOTE: Exercise care when cleaning the coil so that the coil fins are not damaged.

Do not permit the outdoor air discharge to be obstructed by overhanging structures of shrubs.

208/230/460 VOLT
MODELS ONLY

208/230/575 VOLT
MODELS ONLY

YORK®
Heating and Air Conditioning

Proud Sponsor
of the 2000
U.S. Olympic Team

Unitary Products Group
5005 York Drive, Norman, Oklahoma 73069
Subject to change without notice. Printed in U.S.A.
Copyright © by York International Corporation 2000. All Rights Reserved.